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SEQUENCE LISTING

<110> Wu, Shilan
 Hayashi, Jon H.
 Kinne, Lyle P.
 Dierks, Peter M.

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<170> PatentIn version 3.2

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<400> 6

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 35 40 45

Cys Val Val Leu Ala Leu Glu Glu His Leu Pro Asn Gly Asp Lys Thr
 50 55 60

Ile Leu Ala Gln Asn Leu Glu Lys Thr Glu Ala Tyr Phe Leu Gly Ile
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 Phe Cys Val Glu Ala Ser Leu Lys Ile Leu Ala Leu Gly Phe Val Leu
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 His Arg Gly Ser Tyr Leu Arg Asn Val Trp Asn Ile Met Asp Phe Phe
 100 105 110
 Val Val Val Thr Gly Ile Ile Thr Gln Leu Pro Ile Ala Pro Ala Asp
 115 120 125
 Val Asp Phe Arg Thr Leu Arg Ala Ile Arg Val Leu Arg Pro Leu Lys
 130 135 140
 Leu Val Ser Gly Val Pro Ser Leu Gln Val Val Leu Lys Ser Ile Ile
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 Lys Ala Met Ala Pro Leu Leu Gln Ile Gly Leu Leu Val Leu Phe Ala
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 Ile Val Ile Phe Ala Ile Ile Gly Leu Glu Phe Tyr Ser Gly Ala Leu
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 His Lys Thr Cys Tyr Asn Leu Glu Asp Ile Ser Glu Ile Val Asn Glu
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 Gly Asp Ser Ala Thr Pro Cys Asn Ala Asp Asn Val Ser Leu Ala Pro
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 Phe Gly Ala Asn Val Cys Asp Tyr Glu Lys Ser Thr Cys Leu Glu Lys
 225 230 235 240
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 Ala Met Leu Thr Val Phe Gln Cys Ile Thr Met Glu Gly Trp Thr Ala
 260 265 270
 Ile Leu Tyr Trp Thr Asn Asp Ala Leu Gly Ser Ala Phe Asn Trp Ile
 275 280 285
 Tyr Phe Val Pro Leu Ile Val Leu Gly Ser Phe Phe Met Leu Asn Leu
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Val Leu Gly Val Leu Ser Gly Glu Phe Ala Lys Glu Arg Glu Lys Val
 305 310 315 320
 Glu Asn Arg Gln Glu Phe Leu Lys Leu Arg Arg Gln Gln Gln Leu Glu
 325 330 335
 Arg Glu Leu Asn Gly Tyr Val Glu Trp Ile Cys Lys Ala Glu Glu Val
 340 345 350
 Ile Leu Ala Glu Glu Arg Thr Thr Glu Glu Glu Lys Met His Ile Ile
 355 360 365
 Glu Ala Arg Arg Arg Ala Ala Ala Lys Lys Lys Leu Lys Asn Leu Gly
 370 375 380
 Lys Ser Lys Ser Thr Asp Thr Glu Glu Glu Glu Gln Asp Glu Asp Cys
 385 390 395 400
 Gly Asp Asp Gly Phe Leu Lys Ser Lys Ala Arg Ser Ala Gly Arg Phe
 405 410 415
 Ala Asp Phe Trp Arg Ala Glu Lys Arg Phe Arg Phe Trp Ile Arg His
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 Thr Val Lys Thr Gln Trp Phe Tyr Trp Phe Val Ile Val Leu Val Leu
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 Met Met Glu Met Trp Val Lys Met Tyr Ala Leu Gly Pro Arg Ile Tyr
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Tyr Trp Ser Ser Leu Arg Asn Leu Val Ile Ser Leu Leu Asn Ser Met
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 Arg Ser Ile Ile Ser Leu Leu Phe Leu Leu Phe Leu Phe Ile Leu Ile
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 Asp Gly Thr Pro Pro Thr Asn Phe Asn Thr Phe Pro Ile Ala Leu Leu
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 Thr Val Phe Gln Ile Leu Thr Gly Glu Asp Trp Asn Glu Val Met Tyr
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 Asp Gly Ile Gln Ser Gln Gly Gly Ile Gln Arg Gly Met Ile Tyr Ser
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 Thr Ala Ala Glu Glu Glu Gln Val Glu Glu Asp Lys Glu Lys Gln Leu
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 Lys Lys Lys Glu Glu Ala Lys Lys Glu Asp Glu Asp Glu Val Pro Asp
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 Gly Pro Lys Pro Met Leu Pro Tyr Ser Ser Met Phe Ile Leu Ser Pro
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 Phe Asp Phe Phe Ile Met Val Val Ile Cys Met Ser Ser Ala Ala Leu
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 Arg Asp Leu Trp Asn Ile Met Asp Ala Ala Val Val Ile Cys Ala Leu
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 Val Ser Phe Gly Phe Glu Ile Gly Gly Val Lys Lys Gly Ala Gly Gln
 850 855 860
 Asn Leu Ser Thr Ile Lys Ser Leu Arg Val Leu Arg Val Leu Arg Pro
 865 870 875 880
 Leu Lys Thr Ile Lys Arg Val Pro Lys Leu Lys Ala Val Phe Asp Cys
 885 890 895
 Val Val Asn Ser Leu Lys Asn Val Ile Asn Ile Leu Ile Val Tyr Ile
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 Lys Phe Phe His Cys Asn Asp Ile Ser Lys Asn Thr Phe Glu Asp Cys
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 Gln Gly Ser Tyr Phe Val Tyr Glu Ser Asn Ser Leu Leu Pro Lys Val
 945 950 955 960
 Asn Gln Arg Thr Trp Thr Thr Gln Ser Phe His Tyr Asp Asn Val Ala
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 980 985 990
 Gln Val Leu Gln Asn Ser Met Ala Ala Thr Tyr Glu Asp Arg Gly Pro
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 Lys Ala Leu Pro Tyr Val Cys Leu Leu Ile Ala Met Leu Phe Phe
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 Ile Tyr Ala Ile Ile Gly Met Gln Val Phe Gly Asn Ile Glu Leu
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Ala Met Ser Ile Gly Arg Ser Gly Arg Leu Leu Pro Ser Pro Val
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Gln Gln Pro Ser Ser Ser Ser Ser Val Ser Ala Ile Arg Arg Gln
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<212> DNA
<213> *Heliothis virescens*

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 <213> *Heliothis virescens*

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Asp Lys Glu Ala Leu Arg Arg Glu Lys Glu Ala Gln Ala Ile Lys Gln
 35 40 45

Leu Asp Lys Ala Arg Glu Lys Pro Val Ala Phe Ala Val Arg Thr Asn
 50 55 60

Val Ser Tyr Asp Gly Thr Val Asp Asp Asp Ser Pro Val His Gly Ser
 65 70 75 80
 Ala Ile Ser Phe Glu Val Arg Asp Phe Leu His Ile Lys Glu Lys Tyr
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 Asp Asn Asn Trp Trp Ile Gly Arg Leu Val Lys Glu Gly Ser Asp Val
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 Gly Phe Ile Pro Ser Pro Val Lys Leu Glu Ala Val Arg Ser Gly Leu
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 Gly Ala Arg Arg Tyr Pro Arg Pro Ala Ser Ala Ala Pro His Ala Pro
 130 135 140
 His Ala Pro Pro Leu Ser Arg Gly Ser Thr Pro Pro Thr Pro Gly Glu
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 Glu Ser Asp Gly Ala Gly Arg Gly Arg Gly Gly Gly Ala Gly Gly Lys
 165 170 175
 Glu Lys Arg Lys Pro Phe Phe Lys Lys Ala Glu Ala Ser Thr Pro Tyr
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 Asp Val Val Pro Ser Met Arg Pro Val Val Ile Val Gly Pro Ser Leu
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 Lys Gly Tyr Glu Val Thr Asp Met Met Gln Lys Ala Leu Phe Asp Phe
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 225 230 235 240
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 245 250 255
 Ala Ile Met Glu Arg Ser Asn Ser Arg Ser Thr Cys Leu Ala Glu Val
 260 265 270
 Gln Ala Glu Ile Glu Arg Ile Phe Glu Leu Ala Arg Thr Leu Gln Leu
 275 280 285
 Val Val Leu Asp Cys Asp Thr Ile Asn His Pro Ser Gln Leu Ala Lys
 290 295 300

Thr Ser Leu Ala Pro Thr Ile Val Tyr Leu Lys Ile Ser Ser Pro Lys
 305 310 315 320
 Val Leu Gln Arg Leu Ile Lys Ser Arg Gly Lys Gly Gln Thr Lys Asn
 325 330 335
 Leu Ser Val Gln Met Val Ala Ala Glu Lys Leu Ala Gln Cys Pro Pro
 340 345 350
 Asp Met Phe Asp Val Ile Leu Asp Glu Asn Gln Leu Glu Asp Ala Cys
 355 360 365
 Glu His Ile Ala Glu Tyr Leu Glu Ala Tyr Trp Arg Ala Thr His Pro
 370 375 380
 Pro Val Pro Glu Glu Ala Ala Pro Ala Arg Pro Val Pro Arg Thr His
 385 390 395 400
 Asn Ala His Ala Met Pro Gly Gly Arg Ser Arg Ala Ala Arg Pro Glu
 405 410 415
 Arg Leu Glu Glu Glu Tyr Tyr Pro Arg Gly Glu Arg Cys Glu Arg Tyr
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 Glu Arg Gly Tyr Pro Arg Asp Tyr His Glu Tyr Gly Pro Glu Tyr Pro
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 Arg Glu Arg Ala His Ala Ala His Ala Ala Ala Pro His Asp Ala Tyr
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 Gly His Asp Tyr Thr Arg Asp Ala Tyr Ala Arg Glu Glu Tyr Gly Arg
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165

170

175

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Phe Asp Phe Leu Lys Arg Arg Phe Glu Gly Arg Ile Ile Ile Thr Arg
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Lys Val Leu Gln Arg Leu Ile Lys Ser Arg Gly Lys Gly Gln Thr Lys
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Pro Asp Met Phe Asp Val Ile Leu Asp Glu Asn Gln Leu Glu Asp Ala
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Cys Glu His Ile Ala Glu Tyr Leu Glu Ala Tyr Trp Arg Ala Thr His
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 385 390 395 400

His Asn Ala His Ala Met Pro Gly Gly Arg Ser Arg Ala Ala Arg Pro
 Page 29

405

410

415

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Pro Arg Glu Arg Ala His Ala Ala His Ala Ala Ala Pro His Asp Ala
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 Arg Arg Phe Glu Gly Arg Ile Ile Ile Thr Arg Val Gln Ser Asp Ile
 Page 32

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Ser Leu Ala Lys Arg Thr Gln Asn Ala Pro Lys Lys Pro Phe Val Glu
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Arg Glu Arg Ala His Ala Ala His Ala Ala Ala Pro His Asp Ala Tyr

Page 33

485

490

495

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4383

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 Lys Glu Ser Lys Leu Glu Ala Arg Asn Gly Gln Ile Leu Val Ala Asn
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Tyr Ser Leu Pro Arg Arg Arg Pro Lys Thr Ala Cys Ile Arg Thr
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Ser Ala Val Lys Arg Ile Val Glu Ala Ala Glu Asn Met Ala Phe Asp
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Lys Gln Asn Glu Pro Val Pro Glu Asp Phe Gln Phe Tyr Asn Ser Lys
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Glu Met Glu Glu Pro Trp Asp Glu Val Ser Ile Thr Thr Thr Pro Glu
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 Page 46

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catcatgtcg agattagttg aagatgaagt ctacaaggca gtgcatattg ttgattacca 3180
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tgaaaacttg cgcctcgtga tggcatgggt cttagctacc acggtctggt tctacaactc 3300
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taaattttct ggctgcctat tctttatctc tctggtatta ccgttaaaga aaacctcact 4020
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 35 40 45

Glu Leu Tyr His Phe Gly Glu Phe Ile Thr Arg Lys Lys Glu Val Gln
 50 55 60

Asp Ser Phe Lys Ser Ala Gln Val Glu Ser Arg Asp Gly Glu Lys Leu
 65 70 75 80

Val Gln Ser Met Ser Asp Asp Ile Arg Ala Met Met Glu Leu Lys Ile
 85 90 95

Ser Ala Val Lys Arg Ile Val Glu Ala Ala Glu Asn Met Ala Phe Asp
 100 105 110
 Lys Gln Asn Glu Pro Val Pro Glu Asp Phe Gln Phe Tyr Asn Ser Lys
 115 120 125
 Glu Met Glu Glu Pro Trp Asp Glu Val Ser Ile Thr Thr Thr Pro Glu
 130 135 140
 Thr Asp Phe Gly Gln Glu Ser Trp Ile Val Arg Pro Pro Ser Lys Asn
 145 150 155 160
 Ala His Thr Gln Gln Asn Pro His Phe Ser Asn Ile Pro Val Asn Thr
 165 170 175
 Asn Phe Ser Ser Val His Val Pro Thr Asn Val Tyr Ala Trp Ala Pro
 180 185 190
 Glu Val Ile Lys Gly Ile His Trp Ser Glu Gly Leu Asp Thr His Phe
 195 200 205
 Ile Asn Asn Tyr Gln Ser Asp Pro Thr Leu Ser Trp Gln Tyr Phe Gly
 210 215 220
 Ser Ser Thr Gly Phe Met Arg His Tyr Pro Ala Leu Lys Trp Arg Ala
 225 230 235 240
 Asp Pro Val Asp Ile Tyr Asp Cys Arg Thr Arg Ala Trp Tyr Met Glu
 245 250 255
 Ala Ala Ala Ser Pro Lys Asp Val Ile Ile Leu Val Asp Arg Ser Gly
 260 265 270
 Ser Met Thr Gly Gln Arg Arg Asp Ile Ala Lys His Val Val Thr Asn
 275 280 285
 Ile Leu Asp Thr Leu Gly Asn Asn Asp Phe Val Asn Val Leu Thr Phe
 290 295 300
 Ala Asp Thr Val Glu Glu Ile Val Pro Cys Phe Glu Asp Ser Leu Val
 305 310 315 320
 Gln Ala Thr Leu Gly Asn Ile Arg Glu Leu Lys Leu Ala Met Asp Ser
 325 330 335

Phe Glu Thr Gln Glu Ile Ala Asn Phe Ser Ala Ala Leu Thr Arg Ala
 340 345 350
 Phe Glu Leu Leu Glu Ile Tyr Arg Asn Asn Ser Gly Gly Ala Asn Cys
 355 360 365
 Asn Gln Ala Ile Met Leu Val Thr Asp Gly Val Pro Tyr Asn Tyr Lys
 370 375 380
 Glu Ile Phe Glu Lys Tyr Asn Trp Lys Tyr Glu Thr Pro Val Arg Val
 385 390 395 400
 Phe Thr Tyr Leu Ile Gly Arg Glu Val Ala Asp Val Arg Glu Val Lys
 405 410 415
 Trp Met Ala Cys Ala Asn Arg Gly Phe Tyr Val His Leu Ser Thr Leu
 420 425 430
 Ala Glu Val Arg Glu Arg Val Leu Glu His Val Asn Val Leu Ala Arg
 435 440 445
 Pro Leu Val Leu Gln Arg Glu Lys His Pro Val Val Trp Thr Pro Val
 450 455 460
 Tyr Ala Asn Val Thr Asp Pro Lys Val Ala Asp Tyr Leu Trp Glu Gln
 465 470 475 480
 Arg Glu Arg Ala Glu Gln Lys Glu Arg Phe Met Ser Gln Arg Arg Asp
 485 490 495
 Lys Asn Leu Phe Asn Ser Asp Lys Glu Gln Asp Arg Arg Trp Arg Ile
 500 505 510
 Thr Gln Met Lys Gln Gly Gln Tyr Ser Glu Leu Gly Asn Ser Gln Tyr
 515 520 525
 Gln Leu Met Thr Ser Val Ser Met Pro Val Tyr Asp Leu Arg His Asn
 530 535 540
 Glu Ser Val Glu Glu Asn Gly Gln Lys Glu Met Arg Ile Ala Arg Leu
 545 550 555 560
 Leu Gly Ile Ala Gly Thr Asp Val Pro Leu Ser Glu Ile Gln Ala Leu
 565 570 575

Met Thr Pro Tyr Lys Ile Gly Val Asn Gly Tyr Ala Phe Ile Val Thr
580 585 590

Asn Asn Gly Tyr Ile Leu Ile His Pro Asp Leu Arg Pro Val Phe Gln
595 600 605

Gln Ile Leu Lys Pro Ser Tyr Asn Ser Val Asp Met Ile Glu Val Glu
610 615 620

Leu Phe Asp Asp Asp Arg Gly Pro Arg Asn Phe Ser Lys Glu Leu Thr
625 630 635 640

Ala Leu Arg Lys Glu Ile Ile Asp Gln Lys Thr Gly Asn Lys Val Met
645 650 655

Ser Val Lys Tyr His Leu Asp Asp Met Lys Arg Val Ser Arg Ala Lys
660 665 670

Arg His Tyr Phe Trp Thr Gly Ile Ser Asp Ser Pro Phe Thr Leu Val
675 680 685

Val Ala Ile Pro Glu Asn Tyr Gly Arg His Arg Ile Thr Pro Pro Pro
690 695 700

Thr Asp Asp Ile His Arg Leu Ser Leu Thr Ser Lys Asn Ile Ser Ala
705 710 715 720

Arg Gln Tyr Leu Ser Asp Lys Trp Ser Val His Pro Asp Trp Met Tyr
725 730 735

Cys Arg His Tyr Glu Arg Thr Phe Ala Thr Ala Glu Glu Glu Leu Leu
740 745 750

Tyr Phe Leu Glu Arg Val Ala Lys Pro Gly Trp Arg Trp Pro Ala Lys
755 760 765

Pro Arg Pro Pro Glu His His Lys Asn Lys Pro Gly His Glu Arg His
770 775 780

Asn Asn Gly Thr Pro Glu Thr Arg Glu Arg Ser Lys Ile Ser Asn Ser
785 790 795 800

Thr Pro Arg Asn Glu Tyr Tyr Cys Asp His Gly Leu Met Gln Ala Leu
805 810 815

Val Tyr Asp Ala Arg Asn Thr Ala Trp Phe Asn Lys Ser Ile Ser Asp
 820 825 830

Ser Ala Ser Asp Glu Lys Ala Val Glu Phe Ile Gln Arg Phe Gly Tyr
 835 840 845

Ile Val Ala Phe Leu Ser Thr His Ser Gly Leu Thr Arg Trp Gln Thr
 850 855 860

His Pro Pro Lys Glu His Asp Asn Asp Lys Pro Asp Phe Gly Lys Gln
 865 870 875 880

Trp Pro Arg Ala Ile Glu Glu Val Trp Tyr Arg Arg Ala Val Glu Gln
 885 890 895

His Tyr Val Asp Pro Leu Ser Tyr Val Tyr Ser Val Asp Leu Ser Thr
 900 905 910

Val Lys Phe Pro Leu Asn Val Ser Leu Ala Leu Val Thr Ala Ser His
 915 920 925

Ala Val Phe His Gly Asp Gly His Arg Lys Ala Pro Ala Ala Val Val
 930 935 940

Gly Phe Gln Phe Lys His Glu Arg Leu Ser Glu Trp Phe Asp Asn Ile
 945 950 955 960

Thr Ser Ser Cys Glu His Asn Lys Glu Cys Thr Thr Cys Gln Ser Asp
 965 970 975

Asn Trp Asp Cys Tyr Leu Val Asp Asn Asn Gly Trp Val Ile Val Ser
 980 985 990

Glu Asp Ser Thr Gln Thr Gly Gln Phe Phe Gly Arg Ile Arg Pro Asp
 995 1000 1005

Ile Met Ser Arg Leu Val Glu Asp Glu Val Tyr Lys Ala Val His
 1010 1015 1020

Ile Val Asp Tyr Gln Ala Val Cys Phe Arg Glu Lys Lys Thr Thr
 1025 1030 1035

Asn Pro Ala Thr Met Leu Phe Thr Pro Leu Glu Asn Leu Arg Leu
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 1070 1075 1080
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 1085 1090 1095
 Glu Glu Thr Asp Asp Pro Tyr Met Ser Lys Pro Pro Asn Met Arg
 1100 1105 1110
 Val Leu Glu Arg Asp Tyr Glu Lys Leu Val Leu Ile Asn Arg Thr
 1115 1120 1125
 Arg Pro Thr Pro Cys Asp Arg Glu Met Tyr Leu Tyr Gln Leu Asp
 1130 1135 1140
 Tyr Asn Asn Leu Asp Glu Lys Leu Asn Lys Pro Val Ala Glu Cys
 1145 1150 1155
 Gly Arg Pro Phe Ile Ala Gln His Val Asn Tyr Thr Asn Met Leu
 1160 1165 1170
 Met Ile Val Val Asp Ala Asn Cys Pro Lys Asp Glu Val Ala Ala
 1175 1180 1185
 Met Ser Val Asp Ala Thr Glu Val Asn Tyr Asn Glu Ser Leu Pro
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 Cys Leu Lys His Met His Pro Leu Tyr Arg Lys Gln Pro Thr Ser
 1205 1210 1215
 Cys Ile Arg Asn His Thr Glu Glu Ser Asn Ile Asp Met Cys Gly
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33

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24

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Cys Asn Ala Asp Asn Val Ser Leu
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24

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<400> 58

Ile Val Ile Phe Ala Ile Ile Gly
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His Leu Pro Asn Gly Asp Lys Thr
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28

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Phe Asp Val Ile Leu Asp Glu Asn Gln
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Arg Thr Leu Gln Leu Val
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19

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Cys Asn Gln Ala Ile Met Ile Val Ser
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<210> 83

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